

## Department of Energy

## § 431.324

(2) Offers one or more of the following user-oriented or protective functions:

(i) To facilitate the activation or deactivation of other functions (including active mode) by remote switch (including remote control), internal sensor, or timer;

(ii) Continuous functions, including information or status displays (including clocks) or sensor-based functions.

*Wireless control signal* means a wireless signal that is radiated to and received by the ballast for the purpose of controlling the ballast and putting the ballast in standby mode.

[74 FR 12075, Mar. 23, 2009, as amended at 75 FR 10966, Mar. 9, 2010]

### TEST PROCEDURES

#### § 431.323 Materials incorporated by reference.

(a) *General.* We incorporate by reference the following standards into Subpart S of Part 431. The material listed has been approved for incorporation by reference by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Any subsequent amendment to a standard by the standard-setting organization will not affect the DOE regulations unless and until amended by DOE. Material is incorporated as it exists on the date of the approval and a notice of any change in the material will be published in the FEDERAL REGISTER. All approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030 or go to [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html). Also, this material is available for inspection at U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, 6th Floor, 950 L'Enfant Plaza, SW., Washington, DC 20024, 202-586-2945, between 9 a.m. and 4 p.m., Monday through Friday, except Federal holidays, or go to: [http://www1.eere.energy.gov/buildings/appliance\\_standards/](http://www1.eere.energy.gov/buildings/appliance_standards/). Standards can be obtained from the sources listed below.

(b) *ANSI.* American National Standards Institute, 25 W. 43rd Street, 4th Floor, New York, NY 10036, 212-642-4900, or go to <http://www.ansi.org>.

(1) ANSI C78.43-2004, Revision and consolidation of ANSI C78.1372-1997, .1374-1997, .1375-1997, .1376-1997, .1377-1997, .1378-1997, .1379-1997, .1382-1997, .1384-1997, and .1650-2003 ("ANSI C78.43"), American National Standard for electric lamps: Single-Ended Metal Halide Lamps, approved May 5, 2004, IBR approved for § 431.322;

(2) ANSI C82.6-2005, Proposed Revision of ANSI C82.6-1985 ("ANSI C82.6"), American National Standard for Lamp Ballasts—Ballasts for High-Intensity Discharge Lamps—Methods of Measurement, approved February 14, 2005, IBR approved for § 431.322; and § 431.324.

(c) *NFPA.* National Fire Protection Association, 11 Tracy Drive, Avon, MA 02322, 1-800-344-3555, or go to <http://www.nfpa.org>;

(1) NFPA 70-2002 ("NFPA 70"), National Electrical Code 2002 Edition, IBR approved for § 431.326;

(2) [Reserved]

(e) *UL.* Underwriters Laboratories, Inc., COMM 2000, 1414 Brook Drive, Downers Grove, IL 60515, 1-888-853-3503, or go to <http://www.ul.com>.

(1) UL 1029 (ANSI/UL 1029-2007) ("UL 1029"), Standard for Safety High-Intensity-Discharge Lamp Ballasts, 5th edition, May 25, 1994, which consists of pages dated May 25, 1994, September 28, 1995, August 3, 1998, February 7, 2001 and December 11, 2007, IBR approved for § 431.326.

(2) [Reserved]

[74 FR 12075, Mar. 23, 2009, as amended at 75 FR 10966, Mar. 9, 2010]

#### § 431.324 Uniform test method for the measurement of energy efficiency and standby mode energy consumption of metal halide lamp ballasts.

(a) *Scope.* This section provides test procedures for measuring, pursuant to EPCA, the energy efficiency of metal halide ballasts.

(b) *Testing and Calculations Active Mode.* (1)(i) *Test Conditions.* The power supply, ballast test conditions, lamp position, lamp stabilization, and test instrumentation shall all conform to the requirements specified in section 4.0, "General Conditions for Electrical

Performance Tests,” of ANSI C82.6 (incorporated by reference; see § 431.323). Ambient temperatures for the testing period shall be maintained at  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ . Airflow in the room for the testing period shall be  $\leq 0.5$  meters/second. The ballast shall be operated until equilibrium. Lamps used in the test shall conform to the general requirements in section 4.4.1 of ANSI C82.6 and be seasoned for a minimum of 100 hour prior to use in ballast tests. Basic lamp stabilization shall conform to the general requirements in section 4.4.2 of ANSI C82.6, and stabilization shall be reached when the lamp’s electrical characteristics vary by no more than 3-percent in three consecutive 10- to 15-minute intervals measured after the minimum burning time of 30 minutes. After the stabilization process has begun, the lamp shall not be moved or repositioned until after the testing is complete. In order to avoid heating up the test ballast during lamp stabilization, which could cause resistance changes and result in unrepeatable data, it is necessary to warm up the lamp on a standby ballast. This standby ballast should be a commercial ballast of a type similar to the test ballast in order to be able to switch a stabilized lamp to the test ballast without extinguishing the lamp. Fast-acting or make-before-break switches are recommended to prevent the lamps from extinguishing during switchover.

(ii) *Alternative Stabilization Method.* In cases where switching without extinguishing the lamp is impossible or for low-frequency electronic ballasts, the following alternative stabilization method shall be used. The lamp characteristics are determined using a reference ballast and recorded for future comparison. The same lamp is to be driven by the ballast under test until the ballast reaches operational stability. Operational stability is defined by three consecutive measurements, 5 minutes apart, of the lamp power where the three readings are within 2.5 percent. The electrical measurements are to be taken within 5 minutes after conclusion of the stabilization period.

(2) *Test Measurement.* The ballast input power and lamp output power during operating conditions shall be measured in accordance with the meth-

ods specified in section 6.0, “Ballast Measurements (Multiple-Supply Type Ballasts)” of the ANSI C82.6 (incorporated by reference; see § 431.323).

(3) *Efficiency Calculation.* The measured lamp output power shall be divided by the ballast input power to determine the percent efficiency of the ballast under test.

(c) *Testing and Calculations-Standby Mode.* The measurement of standby mode need not be performed to determine compliance with energy conservation standards for metal halide lamp fixtures at this time. The above statement will be removed as part of the rulemaking to amend the energy conservation standards for metal halide lamp fixtures to account for standby mode energy consumption, and the following shall apply on the compliance date for such requirements. However, all representations related to standby mode energy consumption of these products made after September 7, 2010, must be based upon results generated under this test procedure.

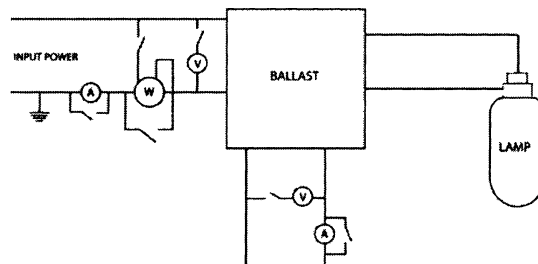
(1) *Test Conditions.* The power supply, ballast test conditions, and test instrumentation shall all conform to the requirements specified in section 4.0, “General Conditions for Electrical Performance Tests,” of the ANSI C82.6 (incorporated by reference; see § 431.323). Ambient temperatures for the testing period shall be maintained at  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ . Send a signal to the ballast instructing it to have zero light output using the appropriate ballast communication protocol or system for the ballast being tested.

(2) *Measurement of Main Input Power.* Measure the input power (watts) to the ballast in accordance with the methods specified in section 6.0, “Ballast Measurements (Multiple-Supply Type Ballasts)” of the ANSI C82.6 (incorporated by reference; see § 431.323).

(3) *Measurement of Control Signal Power.* The power from the control signal path is measured using all applicable methods described below:

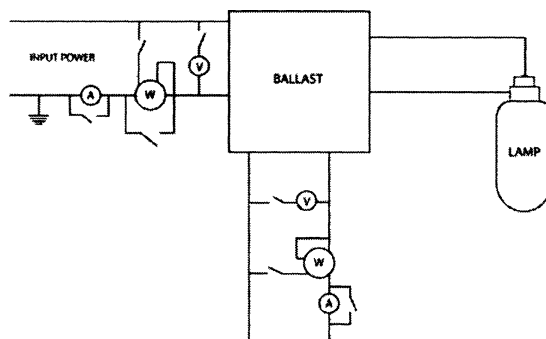
(i) *DC Control Signal.* Measure the DC control signal voltage, using a voltmeter (V), and current, using an ammeter (A) connected to the ballast in accordance with the circuit shown in Figure 1. The DC control signal power is calculated by multiplying the DC

control signal voltage by the DC control signal current.



**Figure 1. Circuit for Measuring DC Control Signal Power in Standby Mode**

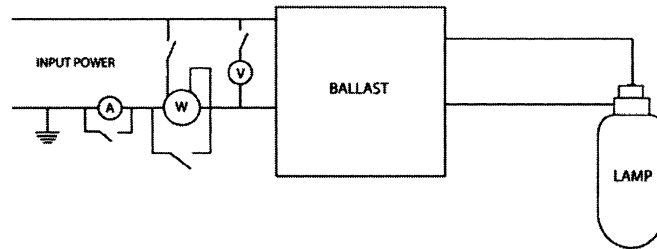
(ii) *AC Control Signal*. Measure the AC control signal power (watts), using a wattmeter capable of indicating true RMS power in watts (W), connected to the ballast in accordance with the circuit shown in Figure 2.



**Figure 2. Circuit for Measuring AC Control Signal Power in Standby Mode**

(iii) *Power Line Carrier (PLC) Control Signal*. Measure the PLC control signal power (watts), using a wattmeter capable of indicating true RMS power in watts (W) connected to the ballast in accordance with the circuit shown in Figure 3. The wattmeter must have a

frequency response that is at least 10 times higher than the PLC being measured to measure the PLC signal correctly. The wattmeter must also be high-pass filtered to filter out power at 60 Hz.



**Figure 3. Circuit for Measuring PLC Control Signal Power in Standby Mode**

[74 FR 12075, Mar. 23, 2009, as amended at 75 FR 10966, Mar. 9, 2010]

**§ 431.325 Units to be tested.**

For each basic model of metal halide lamp ballast selected for testing, a sample of sufficient size, no less than four, shall be selected at random and tested to ensure that:

(a) Any represented value of estimated energy efficiency calculated as the measured output power to the lamp divided by the measured input power to the ballast ( $P_{out}/P_{in}$ ), of a basic model is no less than the higher of:

- (1) The mean of the sample, or
  - (2) The upper 99-percent confidence limit of the true mean divided by 1.01.
- (b) Any represented value of the energy efficiency of a basic model is no greater than the lower of:

- (1) The mean of the sample, or
- (2) The lower 99-percent confidence limit of the true mean divided by 0.99.

[75 FR 10968, Mar. 9, 2010]

**ENERGY CONSERVATION STANDARDS**

**§ 431.326 Energy conservation standards and their effective dates.**

(a) Except as provided in paragraph (b) of this section, each metal halide lamp fixture manufactured on or after January 1, 2009, and designed to be operated with lamps rated greater than or equal to 150 watts but less than or equal to 500 watts shall contain—

- (1) A pulse-start metal halide ballast with a minimum ballast efficiency of 88 percent;
- (2) A magnetic probe-start ballast with a minimum ballast efficiency of 94 percent; or

(3) A nonpulse-start electronic ballast with either a minimum ballast efficiency of 92 percent for wattages greater than 250 watts; or a minimum ballast efficiency of 90 percent for wattages less than or equal to 250 watts.

(b) The standards described in paragraph (a) of this section do not apply to—

- (1) Metal halide lamp fixtures with regulated lag ballasts;
- (2) Metal halide lamp fixtures that use electronic ballasts that operate at 480 volts; or
- (3) Metal halide lamp fixtures that;
  - (i) Are rated only for 150 watt lamps;
  - (ii) Are rated for use in wet locations; as specified by the National Fire Protection Association in NFPA 70 (incorporated by reference; *see* § 431.323); and
  - (iii) Contain a ballast that is rated to operate at ambient air temperatures above 50 °C, as specified in UL 1029, (incorporated by reference; *see* § 431.323).

**§ 431.327 Submission of data.**

(a) *Certification.* (1) Except as provided in paragraph (a)(2) of this section, each manufacturer or private labeler, before distributing in commerce any basic model of equipment covered by this subpart and subject to an energy conservation standard set forth in this part, shall certify by means of a compliance statement and a certification report that each basic model meets the applicable energy conservation standard.

(2) Each manufacturer or private labeler of a basic model of metal halide lamp ballast shall file a compliance